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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,583	08/19/2005	Alan John Hopper	056258-5098	7148

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MORGAN LEWIS & BOCKIUS LLP  
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WASHINGTON, DC 20004

EXAMINER
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TADAYYON ESLAMI, TABASSOM

ART UNIT	PAPER NUMBER
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1792

MAIL DATE	DELIVERY MODE
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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/528,583	<b>Applicant(s)</b> HOPPER ET AL.	
	<b>Examiner</b> TABASSOM TADAYYON ESLAMI	<b>Art Unit</b> 1792	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 24-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 24-30 is/are rejected.
- 7) ☒ Claim(s) 9,10,24 and 28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>07/29/05, 03/21/05</u> . | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 4-8, 11, 15, 18, 24-26, 28 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce A. Lent et al (U. S. Patent: 5270368, here after Lent), further in view of Songvit Setthachayanon (U. S. Patent: 5089376, here after 376).

Claims 1, 5, 11, 24 and 28 are rejected. Lent teaches a method for making an electronic device such as printed circuit board[abstract]comprising, applying a mask to a dielectric substrate (ceramic) by ink jet printer inherently to selected area of the substrate[ column 3 lines 22-25]. Lent teaches exposing the mask ink to actinic radiation (UV) [abstract]. Lent also teaches the mask is for using in printing circuit board and for applying metal layer (copper plating) onto it [column 1 lines 40-55]. Lent also discloses that the mask can be applied to a substrate by ink jet painter under control of a computer [column 2 lines 37-39]. Lent further teaches the mask ink comprises,

Acrylate functional monomer (acrylated epoxy monomer), adhesion promoting organic compound, initiator (photo initiator), surfactant, and pigment [column 3 lines 37-52]. Lent also teaches the composition further comprising a colorant [column 7 lines 38-41]. Lent teaches the amount of acrylate functional monomers is from 5-95% [column 8

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example 1], amount of metal adhesion promoting organic compound is 2-10% [column 7 lines 39-43], the amount of initiator is 2-10% [column 6 lines 9-11], and amount of colorant in range about 0.5-4% [column 7 lines 41-43], where the percentages is based on weight percent. Although Lent does not clearly teach the mask is a solder mask or for applying solder to the substrate, however it is obvious that the mask is capable to be employed as solder mask, because Lent teaches the mask is suitable to apply metal layers on it. The composition taught by Lent also is free of organic solvents and is a non aqueous composition (not include water) [example 1]. Lent does not teach the composition comprising polymer. 376 teaches a solder mask comprising a UV sensitive coating composition [abstract] comprising a functional monomer (cross linker) [column 3 lines 25-28, lines 48-49] photoinitiator, pigment (colorant), and adhesive promoting (binder) composition [column 3 lines 4-17]. 376 further teaches the composition comprising a copolymer as a binder (or adhesion promoting agent) [column 3 lines 46-49]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making an electronic device as Lent teaches where the resist mask comprising an adhesive promoting agent and also a copolymer binder as 376 teaches, because 376 teaches it is suitable to have polymer as binder in solder mask resist composition. As Lent teaches the amount of the adhesion promoting agent is 2-10%, therefore is obvious to substitute some of this amount with the copolymer binder (zero or more percent) to have both kinds of binders in composition. It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a this

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composition to be used for the very same purpose...[T]he idea of combining them flows logically from their having been individually taught in the prior art. *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069 1072. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making an electronic device as Lent teaches where the resist mask comprising an adhesive promoting agent and also a copolymer binder as 376 teaches with total amount of 2-10% as Lent teaches, because it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose.

Claim 2 is rejected. Lent and 376 teach the limitation of claim 1 as discussed above. Lent further teaches the viscosity of the composition is 1-10 cpoise at 25 degree C [column 7 lines 63-64]. Although Lent does not teach how much the viscosity in 40 degree C is, however it is inherent that the viscosity decreases with temperature and also it is obvious that the viscosity of the ink has to be appropriate so the ink can be ejected from the ink jet printer as the viscosity of the ink is result effective variable [MPEP 2144.05.II.B]. If the ink is very viscous, the ink can not drop from the nozzle and if it the viscosity of the ink is very low, then the ink will not stay on the surface at specific places (to make a pattern) and run everywhere on the surface. Therefore, it would have been obvious to optimize the viscosity of the ink. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have a method of making an electronic device as Lent and 376 teaches, where the viscosity of eh ink is 8-20 cps(optimized), because the viscosity of eth ink is result effective and has to be optimized.

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Claim 4 is rejected. Lent and 376 teach the limitation of claim 1 as discussed above and 376 teaches the acrylated functional monomer is trimethylolpropane ethoxylate tiacrylate[ column 9 lines 46-47]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making an electronic device as Lent and 376 teach, where the acrylated functional monomer is trimethylolpropane ethoxylate tiacrylate as 376 teaches, because 379 teaches it is suitable to have is trimethylolpropane ethoxylate tiacrylate as acrylated monomer in solder mask composition.

Claim 6 is rejected. Lent and 376 teach the limitation of claim 1 as discussed above and 376 teaches a cross linker also helps the solder mask to improves adherence to metals [column 3 lines 39-45], and further teaches the cross linker is (meth) acrylate monomers [column3 lines 48-49]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making an electronic device as Lent and 376 teach where the adhesion promoting agent comprising acrylate functional monomers as 376 teaches, because 376 teaches combination of binder, a crosslinker and a carboxylated urethane di (and/or) tri (meth) acrylate improves the resist to adhere to metal.

Claim 7 is rejected for the same reason claim 6 is rejected. 376 teaches carboxylated urethane di and/or tri (meth) acrylates are prepared from carboxylic acid [column 2 lines 43-61] which is inherently a metal chelant group.

Claim 8 is rejected for the same reason claim 6 is rejected. 376 also teaches the binder is methylmethacrylate-methylacrylate methacrylic acid [column 9 lines 24-26].

Claim 18 is rejected. Lent teaches the amount of initiator is up to %10[column 6 lines 9-10].

Claim 25 is rejected for the same reason claims 1 and 2 are rejected.

Claim 26 is rejected for the same reason claim 25, 10, and 7 are rejected.

Claim 30 is rejected. Lent teaches obtaining a printed circuit board by this method.

3. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce A. Lent et al (U. S. Patent: 5270368, here after Lent), and Songvit Setthachayanon (U. S. Patent: 5089376, here after 376), as applied to claim 1 above, further in view of Isao Sasaki et al ( U. S. Patent: 478962, here after Sasaki).

Claim 3 is rejected. Lent and 376 teach the limitation of claim 1 as discussed above, they do not teach the molecular weight of the acrylate functional monomer is not greater than 2000. Sasaki teaches a solder mask usable for making printed circuit boards[abstract last 6 lines, column 1 lines 13-17], containing acrylated functional monomer, where the monomer has average molecular weight of less than 2000[column 2 lines 45-57]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making an electronic device as Lent and 376 teach where the molecular weight of the monomer is less than 2000 as Sasaki teaches, because Sasaki teaches the molecular weigh appropriate for monomers is 200-800 for making solder mask composition.

Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce A. Lent et al (U. S. Patent: 5270368, here after Lent), and Songvit

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Setthachayanon (U. S. Patent: 5089376, here after 376), further in view of Yasufumi Sato et al (U. S. Patent: 4839400, here after Sato).

Claim 9 is rejected. Lent and 376 teach the limitation of claim 1 as discussed above, they do not teach the composition comprising polypropylene glycol tetra acrylate containing meth(acrylate) acid as adhesion promoter. Sato teaches a curable resin[abstract lines 1-2] usable to make solder mask for making printed wiring boards[ column 8 lines 46-56], where the monomers of meth(acrylic) acid such as polyethyleneglycol mono (meth) acrylate is in the composition[column 6 lines 54-57] to increase the adhesion. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making an electronic device as Lent and 376 teach where the composition comprising polyethyleneglycol tetra (meth) acrylate containing meth(acrylic) acid as Sato teaches the composition comprising polyethyleneglycol mono (meth) acrylate is suitable to form a resin for solder mask.

Claim 10 is rejected. Lent 376 and Sato teach the limitation of claim 9 as discussed above and 376 teaches the acid value of the adhesion promoter is less than 120 mg KOH/g[column 9 lines 18-20].

4. Claims 16, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bruce A. Lent et al (U. S. Patent: 5270368, here after Lent), and Songvit Setthachayanon (U. S. Patent: 5089376, here after 376), as applied to claim 1 above, further in view of Toshihiro Motoshima et al ( U. S. Patent: 5677398, here after 398).



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Claim 16 is rejected. Lent and 376 teach the limitation of claim 1 as discussed above. They do not teach the ink has an acid value of less than 30 mg KOH/g. 398 teaches a curable resin composition[abstract last 5 lines] usable as solder resist(mask) and printing ink[column 1 lines 6-12], where the acid value of the resist is 20[column 6 lines 6-7]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have a method of making an electronic device as Lent and 376 teach where acid value of the resist (ink) is less than 30(20) mg KOH/ g, as 398 teaches, because 398 teaches it is suitable acid value for curable ink usable as solder resist mask.

Claim 27 is rejected for the same reason claims 25 and 16 are rejected.

Claim 29 is rejected. Lent 376 and 398 teach the limitation of claim 27 as discussed above and it is inherent that the ink jet printer using by Lent has a cartridge having a chamber where the ink (solder mask ink) is inside the chamber, As Lent teaches the ink is applied by ink jet printing method [ abstract lines 1-5].

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TABASSOM TADAYYON ESLAMI whose telephone number is (571)270-1885. The examiner can normally be reached on 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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